

The multi-purpose PowerPrint® 1600 UV Screen Ink Series meets the increased processing speeds of modern printing equipment, curing at lower levels of ultraviolet energy, thereby reducing energy costs and substrate heat exposure. PowerPrint® 1600 Series cures to a tough finish that is highly block resistant. It is engineered to be cost effective for indoor and outdoor retail displays. PowerPrint® 1600 Series includes both gloss and matte colors.

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Substrates

- Styrene
- Rigid vinyl
- Pressure sensitive vinyl
- Polycarbonate
- Some acrylics
- Coated paper / coated cardstocks
- Treated fluted polypropylenes (*see Additives section*)

Substrate recommendations are based on commonly available materials intended for the ink's specific market when the inks are processed according to this technical data. While technical information and advice on the use of this product is provided in good faith, the User bears sole responsibility for selecting the appropriate product for their end-use requirements. Reference the 'Quality Statement' at the end of this document.

User Information

Mesh

355-420 tpi (140-165 tpcm) with a mesh opening of 22-38 um monofilament polyester mesh for most applications.

305-355 tpi (120-140 tpcm) with a mesh opening of 50 um or more monofilament polyester can be used for specialty applications (*i.e. pearlescents, aluminums, etc.*).

Coarser mesh counts and/or twill weave result in heavier ink deposit requiring additional cure output.

Stencil

Use direct emulsions and capillary films which are solvent resistant and UV compatible.

Squeegee

70-90 durometer polyurethane squeegee.

Coverage

Estimated 3,200 – 4,200 square feet (295 - 390 square meters) per gallon depending upon ink deposit. Reference www.nazdar.com for examples of coverage calculations.

Printing

PowerPrint® 1600 Series is formulated to be press ready. Thoroughly mix the ink prior to printing. Improper mixing can lead to inconsistent color and ink performance.

Maintain ink temperature at 65°-90°F (18°-32°C) for optimum print and cure performance. Lower temperatures increase the ink viscosity, impairing flow and increasing film thickness. Elevated temperatures lower the ink viscosity, reducing print definition and film thickness.

Pretest to determine optimum printing parameters for a particular set of ink, substrate, screen, press, and curing variables/conditions.

Note: Thin gauge vinyl or styrene substrate may become more brittle after printing, especially with higher heat output from the UV cure reactor and/or with 2-sided printing. Thorough print, finishing, shipping, and display testing should be conducted prior to full production.

The ink can be affected by stray UV light. Be aware of skylights, windows and overhead lights curing the ink in the screen; light filters are recommended. Leaving a container uncovered may result in the ink's surface forming a "skin", caused by reaction with ambient lighting. Keep containers covered.

Nazdar does not recommend inter-mixing of PowerPrint® 1600 Series with other inks besides the PowerPrint® 1600 Series.

Pad Printing

1600 Series can be pad printed. When pad printing with a UV ink on a 3D image, care must be taken to assure the correct amount of UV light output reaches the entire ink surface. Cure units that rotate the printed part in front of the cure lamp are the best solution for UV pad printing.

Use a silicone pad with good chemical resistance for printing. Clean equipment using the chemicals listed below in the cleanup section.

UV Screen Ink

Nazdar PowerPrint® 1600 UV Screen Ink Series

Cure Parameters

PowerPrint® 1600 Series cures when exposed to a single medium pressure mercury vapor lamp emitting output millijoules (mJ) and milliwatts (mW) of:

80-100 mJ/cm² @ 600+ mW/cm²
for most colors

100-130 mJ/cm² @ 600+ mW/cm²
for 1678, 1679, 16156, and 1698

These guidelines are intended only as a starting point for determining cure parameters, which must be determined under actual production conditions. "Undercuring" the ink may result in poor adhesion, lower block resistance, reduced durability, and higher residual odor. "Overcuring" the ink may reduce the flexibility of the printed part and adhesion of subsequent ink layers.

To increase mJ levels, slow down the belt speed or scan speed. To increase mW levels, increase the wattage setting of the UV reactor. To optimize mJ and mW output, maintain the bulb and reflector, and ensure proper focus to the substrate.

These guidelines are representative of measurements taken using an EIT® UVICURE® Plus radiometer measuring the UVA bandwidth (320-390 nm). To obtain accurate mW readings with the UVICURE® Plus, reduce the belt speed to less than 40 ft/min.

Note: Porous substrates allow ink to dive below the surface requiring a more thorough cure to overcome the added ink thickness.

Clears / Varnishes

Mixing Clear: Use 1626 Mixing Clear to reduce the density of colors.

Metallic Mixing Clear: Use 1636 Metallic Mixing Clear as a clear base for specialty additives such as Metallic and Pearlescent effects.

Overprint Clear: Use 1627 Overprint Clear to provide added surface protection and increase durability.

Matte Overprint Clear: Use M1627 Overprint Clear to reduce the gloss level of the print.

Common Performance Additives

The market specific performance properties of the PowerPrint® 1600 Series should be acceptable for most applications without the need for additives. When required, any additives should be thoroughly mixed before each use. Prior to production, test any additive adjustment to the ink. Inks containing additives should not be mixed with other inks.

Example for additives: Ink at 100g with 8% of an additive is calculated as:

$$100\text{g ink} + 8\text{g additive} = 108\text{g total}$$

Reducer: Use RE301 UV Reducer to reduce the viscosity of these inks. Add up to 10% by weight. Over reduction can reduce print definition, film thickness and adversely affect cure.

Flexibilizer: Use RE308 UV Reducer to increase the flexibility of these inks. Add up to 10% by weight. The addition of RE308 UV Reducer could show a decrease in block resistance.

Adhesion Promoter: Use NB80 UV Adhesion Promoter to enhance adhesion. Add up to 5% by weight. Improved adhesion will be demonstrated within 24 hours, with full cross linking in 4-7 days. Ink mixed with NB80 UV Adhesion Promoter has a 4-8 hour pot life.

Gloss / Flattening Powders / Improved Slip:

Use CARE118 UV Satin Paste to reduce gloss and improve slip. Add up to 20% and power mix into the ink.

Use CARE63 Anti-Blocking Additive to reduce the potential for blocking, reduce gloss, and improve slip. Add up to 10% and power mixed into the ink.

Cleanup

Screen Wash (Prior to Reclaim): Use IMS201 Premium Graphic Screen Wash, IMS203 Economy Graphic Screen Wash, or IMS206 Graphic Auto Wash.

Press Wash (On Press): Use IMS301 Premium Graphic Press Wash.

Storage / Shelf Life

Store closed containers at temperatures between 65°-78°F (18°-25°C). Storing products outside of these recommendations may shorten their shelf life. Ink taken from the press should not be

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returned to the original container; store separately to avoid contaminating unused ink.

Standard 1600 Series items supplied in 1-gallon (4/5 kilo) containers or smaller are useable for a period of at least 24 months from the date of manufacture. Shelf life above applies to the standard ink items listed on this TDS. To obtain the shelf life for special inks and additives, contact Nazdar Customer Service or Nazdar Technical Service - see contact listing at the end of this document. Contact Nazdar Technical Service at InkAnswers@nazdar.com, for any questions.

Processing

The excellent adhesion and hard surface finish of the PowerPrint® 1600 Series allows for the stacking of printed sheets ink to ink without blocking problems on coated paper, coated board, rigid styrene, rigid vinyl and rigid plastic substrates.

See notes outlined under the sections: 'Printing' and 'Cure Parameters'.

General Information

Ink Handling

Wear gloves and barrier cream to prevent direct skin contact. Safety glasses are suggested in areas where ink may be splashed. If ink does come in contact with skin, wipe ink off with a clean, dry cloth (do not use solvent or reducer). Wash the affected area with soap and water. Consult the applicable [Safety Data Sheet](#) (SDS / MSDS) for further instructions and warnings.

For assistance on a wide range of important regulatory issues, consult the following Regulatory Compliance Department link at <http://www.nazdar.com> or contact Nazdar Ink Technologies - World Headquarters (see contact listing at the end of this document).

Adhesion Testing

Even when recommended UV energy output levels are achieved, it is imperative to check the degree of cure on a **cooled down** print:

1. Touch of ink surface – the ink surface should be smooth.
2. Thumb twist – the ink surface should not mar or smudge.

3. Scratch surface – the ink surface should resist scratching.
4. Cross hatch tape test – per the ASTM D-3359 method, use a cross hatch tool or a sharp knife to cut through ink film only; then apply 3M #600 clear tape on cut area, rub down, and rip off at a 180 degree angle. Ink should only come off in actual cut areas.

Full adhesion characteristics at proper cure levels are demonstrated within 4 hours.

Weathering / Outdoor Durability

At full strength and properly cured, PowerPrint® 1600 Series colors are formulated to provide 2 years outdoor durability when mounted vertically in the Central U.S.A. The use of 1627 Overprint Clear increases outdoor durability.

Exceptions: 1600 Matte Colors and 1600 EC (Economy) Halftones have a projected 6 months outdoor durability.

Outdoor durability cannot be specified exactly. Slight color change and loss of gloss should be expected. Variables affecting a printed part's durability include:

- Ink film thickness and degree of curing
- Color formulation:
 - Large amounts of mixing clear or white
 - Mixing several colors into one match
 - Mixing a small quantity of any single color
- Substrate type and age
- Mounting angle and directional orientation
- Geographical location
- Degree of air pollution
- Excessive abrasion
- Non-clear coated prints exhibit more color change and loss of gloss

Manufacturer's Product Offering

Based on information from our raw material suppliers, these ink products are formulated to contain less than 0.06% lead. If exact heavy metal content is required, independent lab analysis is recommended.

Halftone Colors

Halftone Extender Base is used to reduce the density of any of the halftone colors.

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Standard Halftone Colors are formulated with hues and densities common to the graphic industry.

Dense Halftone Colors are formulated with increased densities over the Standard Halftone colors and are designed for printers who want to have the latitude to adjust the density levels.

Yellow Dense (RS) Halftone is intended to better facilitate matching redder shades without blending Halftone Magenta into the Halftone Yellow.

High Intensity Halftone Black has been developed to function as a dense halftone and line color in a single pass.

Low Tack Rheology (LTR) Halftones can achieve the fastest processing speeds on newer in-line presses and cylinder presses while maintaining dot quality with very minimum dot pile.

Medium Tack Rheology (MTR) Halftones can achieve processing speeds for flatbed, clam shell and most in-line presses while maintaining dot quality.

Economy (EC) Magenta & Economy (EC) Yellow Halftones are formulated to provide a cost effective alternative to the more durable Halftone Magenta and Yellow. Economy Halftone Colors are indoor/short-term outdoor colors.

Matte Halftones: are formulated with hues and densities similar to the standard halftones and exhibit a flat finish.

T7 Halftones: are designed to print to the targeted values of the seven colors (CMYK & RGB) as stated in ISO 12647-2 specification for process color reproduction. These inks can meet the ISO targeted numbers and achieve a neutral 100x3 black when printed on a substrate with a white value similar to a #1 Grade Coated Paper. Best results are achieved when printing these inks at the following solid ink density values and printing sequence:

Cyan	1.45 – 1.50
Yellow	0.95 – 1.00
Magenta	1.25 – 1.30

Standard Printing Colors

Standard Printing Colors: have excellent opacity and flow characteristics. These colors are intended to work as supplied.

Matte Standard Printing Colors: are supplied in a limited range. These colors are intended to work as supplied and exhibit a matte finish.

Pantone Matching System® Base Colors

Pantone Matching System Base Colors are used to simulate the Pantone® Formulation Guide. These inks are press ready, can be used in matches to achieve Pantone color simulations, or let down with mixing clear. ColorStar® Color Management System software uses Pantone Matching System Base Colors to match Pantone colors. Blend formulations are also available at www.nazdar.com using ColorStar On-Line.

360 Series Colors: 16360-16369 colors are formulated to have no white or opaque pigments. This allows the colors to be more vibrant and allows for a better match of intense and darker colors.

Matte 360 Series Colors: M16360-M16369 colors are used in the same manner as the Pantone Matching System Base Colors but exhibit a flat finish.

Fluorescent Colors

PowerPrint® 1600 Series ink is inter-printable with the one-part 32500 PowerPrint® Fluorescent colors. Refer to the PowerPrint® Fluorescent technical data sheet for item numbers, substrate range, and processing information.

Pantone 871c-877c Metallic Simulated Colors

Pantone® 871c to 877c colors have been matched in PowerPrint® 1600 Series ink using pearlescent pigments. When printed on a white background, a gold or silver metallic effect is achieved. A 305 tpi (120 tpcm) mesh with a mesh opening of 50 um or more is recommended.

Special Effect Pigments

When inks are to be printed with a special effect color, all ink layers must be evaluated for intercoat adhesion before proceeding with the production run. To maximize intercoat adhesion, specialty colors should be printed as late as possible in the print sequence.

Pigments may settle in the container; prior to printing, thoroughly mix the ink.

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The following special effect pigments may be added to PowerPrint® 1600 Series. Contact Nazdar for the item number(s) and availability of special effect products. Technical Data Sheets for each of the following special effect pigments can be found at www.nazdar.com.

Metallic Silver (aluminum): Add up to 8% by weight.

Metallic Gold (bronze): Add up to 15% by weight. Chemical reactions in metallic inks may result in viscosity, color and printability changes over time; due to this, mix only enough metallic ink to be used the same day.

Pearlescent / Interference: Add up to 20% by weight.

Multi-Chromatic: Add up to 10% by weight.

Phosphorescent: Add up to 30% by weight.

Fluorescents: Add up to 30% by weight. Fluorescent colors fade quickly with exposure to ultraviolet light. This includes outdoor exposure as well as UV reactor exposure.

Color Card Materials

The following is a list of available screen printed sample literature representing 1600 Series.

UV Color Card (CARDUV): shows the Standard Printing Colors, Pantone Matching System Base Colors, and Halftone Colors.

Special Effects Color Card (CARDSPL): shows various special effect pigments mixed with clear.

Non-Metallic Pantone Simulations sheet (LIT0121): shows the 871c to 877c Pantone metallic color matches using pearlescent pigments.

Packaging / Availability

Contact your Nazdar distributor for product availability and offering.

Standard Ink Items

Check with your distributor for available container size.

MTR T7 Standard / Dense Halftone Colors
(Medium Tack Rheology)

Item Number	Color
16140	Halftone Extender Base
16141	Halftone Cyan

16147	Halftone Yellow
16146	Halftone Magenta
16144	Halftone Black
16151	Halftone Cyan Dense
16157	Halftone Yellow Dense
16154	Halftone Black Dense

LTR T7 Standard / Dense Halftone Colors
(Low Tack Rheology)

Item Number	Color
16120	Halftone Extender Base
16121	Halftone Cyan
16127	Halftone Yellow
16126	Halftone Magenta
16124	Halftone Black
16131	Halftone Cyan Dense
16137	Halftone Yellow Dense
16134	Halftone Black Dense

MTR Standard / Dense Halftone Colors
(Medium Tack Rheology)

Item Number	Color
16EC147	Economy Halftone Yellow
16148	Halftone Magenta
16EC148	Economy Halftone Magenta
16155	Halftone Yellow Dense RS
16156	High Intensity Halftone Black
16EC157	Economy Halftone Yellow Dense
16158	Halftone Magenta Dense
16EC158	Economy Halftone Magenta Dense

LTR Standard / Dense Halftone Colors
(Low Tack Rheology)

Item Number	Color
16128	Halftone Magenta
16EC137	Economy Halftone Yellow Dense
16138	Halftone Magenta Dense
16EC138	Economy Halftone Magenta Dense

Standard Printing Colors

Item Number	Color
1610	Primrose Yellow
1611	Lemon Yellow
1612	Medium Yellow
1613	Emerald Green
1619	Fire Red
1620	Brilliant Orange
1626	Mixing Clear

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1627	Overprint Clear
1636	Metallic Mixing Clear
1652	Super Opaque Black
1667	Reflex Blue
1668	Process Blue
1675	Super Opaque White
1678	High Intensity White
1679	High Intensity Black
1698	Bright White

Matte Standard Printing Colors

Item Number	Color
M1626	Matte Mixing Clear
M1627	Matte Overprint Clear
M1652	Matte Super Opaque Black
M1675	Matte Super Opaque White
M1679	Matte High Intensity Black

Pantone Matching System® Base Colors

Item Number	Color
16358	Tinting White
16359	Tinting Black
16360	Orange
16361	Yellow
16362	Warm Red
16363	Rubine Red
16364	Rhodamine Red
16365	Purple
16366	Violet
16367	Reflex Blue
16368	Process Blue
16369	Green

Matte Pantone Matching System® Base Colors

Item Number	Color
M16358	Matte Tinting White
M16359	Matte Tinting Black
M16360	Matte Orange
M16361	Matte Yellow
M16362	Matte Warm Red
M16363	Matte Rubine Red
M16364	Matte Rhodamine Red
M16365	Matte Purple
M16366	Matte Violet
M16367	Matte Reflex Blue
M16368	Matte Process Blue
M16369	Matte Green

Non-Standard Ink Items

Non-Standard ink items are special order, non-inventoried colors which may require additional lead time. Check with your distributor for available container size.

Matte Halftone Colors

Item Number	Color
M1690	Matte Halftone Extender Base
M1691	Matte Halftone Cyan
M1692	Matte Halftone Magenta
M1693	Matte Halftone Yellow
M1694	Matte Halftone Black

Pantone 871c-877c Metallic Simulated Colors

Item Number	Color
67324916	SPL 16 871C Pearl Gold
67324316	SPL 16 872C Pearl Gold
67324416	SPL 16 873C Pearl Gold
67324516	SPL 16 874C Pearl Gold
67324616	SPL 16 875C Pearl Gold
67324716	SPL 16 876C Pearl Gold
67324816	SPL 16 877C Pearl Silver

Additives / Reducers

Item Number	Item Description
RE301	UV Reducer
RE308	UV Reducer
CARE118	UV Satin Paste
CARE63	Anti-Blocking Additive
NB80	UV Adhesion Promoter

Cleaners / Clean Up

Item Number	Item Description
IMS201	Premium Graphic Screen Wash
IMS203	Economy Graphic Screen Wash
IMS206	Graphic Auto Screen Wash
IMS301	Premium Graphic Press Wash

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Nazdar Quality Statement

Nazdar® stands behind the quality of this product. Nazdar® cannot, however, guarantee the finished results because Nazdar® exercises no control over individual operating conditions and production procedures. While technical information and advice on the use of this product is provided in good faith, the User bears sole responsibility for selecting the appropriate product for their end-use requirements. Users are also responsible for testing to determine that our product will perform as expected during the printed item's entire life-cycle from printing, post-print processing, and shipment to end-use. This product has been specially formulated for screen printing, and it has not been tested for application by any other method. Any liability associated with the use of this product is limited to the value of the product purchased from Nazdar®.

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